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Remarks:

Amendments to the claims:

Claims 1 and 3-14 are pending in this application. By this Amendment, claims 1, 3, 4, 7, 8, 11 and 12 are amended and claims 2 and 15 are canceled. Claims 1, 7 and 11 are amended to address a claim rejection; claims 3 and 4 are amended to correct antecedent basis; and claims 11 and 12 are amended to clarify that the ratio recited therein is "weight to weight ratio".

No new matter is added to the application by this Amendment. Support for the new features added to claim 1 is found in claim 8 and canceled claims 2 and 15.

Regarding the objection of claims 1, 7 and 10:

Applicants respectfully traverse the objection of the foregoing claims.

In response to the objections, claims 1 and 7 were amended to replace the term "sulphide" with the term "sulfide" and claim 11 was amended to replace the term "rom" with the term "from". Applicants submit that the amendments to claims 1, 7 and 10 overcome the claim objections as set forth in the Office Action.

Applicants respectfully request withdrawal of the objection to the claims.

Regarding the rejection of claims 1, 2, 6-8 and 13 under 35 USC 102(b) as allegedly being anticipated by U.S. Patent No. 1,922,301 to Kekich:

Applicants respectfully traverse the rejections of the foregoing claims in view of Kekich.

Prior to discussing the relative merits of the Examiner's rejection, Applicants point out that unpatentability based on "anticipation" type rejection under 35 USC 102 requires that the invention is not in fact new. See *Hoover Group, Inc. v. Custom Metalcraft, Inc.*, 66 F.3d 299, 302, 36 USPQ2d 1101, 1103 (Fed. Cir. 1995) ("lack of novelty (often called 'anticipation') requires that the same invention, including each element and limitation of

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the claims, was known or used by others before it was invented by the patentee"). Anticipation requires that a *single reference* [emphasis added] describe the claimed invention with sufficient precision and detail to establish that the subject matter existed in the prior art. See, *In re Spada*, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990).

The principle of "inherency," in the law of anticipation, requires that any information missing from the reference would nonetheless be known to be present in the subject matter of the reference, when viewed by persons experienced in the field of the invention. However, "anticipation by inherent disclosure is appropriate only when the reference discloses prior art that must necessarily include the unstated limitation, [or the reference] cannot inherently anticipate the claims." *Transclean Corp. v. Bridgewood Servs., Inc.*, 290 F.3d 1364, 1373 [62 USPQ2d 1865] (Fed. Cir. 2002); *Hitzeman v. Rutter*, 243 F.3d 1345, 1355 [58 USPQ2d 1161] (Fed. Cir. 2001) ("consistent with the law of anticipation, an inherent property must necessarily be present in the invention described by the count, and it must be so recognized by persons of ordinary skill in the art"); *In re Robertson*, 169 F.3d 743, 745 [49 USPQ2d 1949] (Fed. Cir. 1999) (that a feature in the prior art reference "could" operate as claimed does not establish inherency).

Thus when a claim limitation is not explicitly set forth in a reference, evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." *Continental Can Co.*, 948 F.2d at 1268. It is not sufficient if a material element or limitation is "merely probably or possibly present" in the prior art. *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 295 F.3d 1292, 1295 [63 USPQ2d 1597] (Fed. Cir. 2002). See also, *W.L. Gore v. Garlock, Inc.*, 721 F.2d at 1554 (Fed. Cir. 1983) (anticipation "cannot be predicated on mere conjecture respecting the characteristics of products that might result from the practice of processes disclosed in references"); *In re Oelrich*, 666 F.2d 578, 581 [212 USPQ 323] (CCPA 1982) (to anticipate, the asserted inherent function must be present in the prior art).

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Applicants take this opportunity to clarify the teachings of Kekich based on the description and expressly shown in Figs 1-4 of Kekich. The description of the figures essentially is the basis of the disclosure made by Kekich.

Kekich discloses that sulfide ore is converted to matte in furnace A which is expressly noted as being the traditional copper blast furnace. The matte of Kekich, which contains copper and other metals, as well as silica, is transferred to receptacle B (see page 1, lines 80-95 of Kekich) which assumes that a combination of molten slag, matte and metal is tapped from the blast furnace A. Additionally, Kekich further discloses that the charge to receptacle B contains the usual metal and slag constituents which separate and the excess of slag removed (see page 2, line 10 of Kekich). Thus, the process of Kekich is conducted with a residual top layer of slag G, a principal middle layer J of matte (having a surface H on which slag G floats) and a bottom layer of molten metal K (see page 1, line 109 – page 2, line 30 of Kekich).

The essence of the invention of Kekich resides in introducing air, with reactive agents or fuel or both, downwardly into the matte beneath the slag, and directing the air, reactive agents and fuel downwardly in the upper portion of the matte, beneath the slag (see page 2, lines 20-55 of Kekich).

In the Office Action, the Patent Office alleges that Kekich teaches the step of adding matte and flux to a slag phase. Applicants respectfully disagree with this allegation.

Nowhere does Kekich teach or suggest adding matte and flux to a slag phase as required by claim 1. The step of Kekich unambiguously introduces air with at least one of flux and fuel into the matte. This step of Kekich is conducted to flux impurities in the matte so they can be removed from the matte and collect in the slag layer G (see page 1, lines 4-8 of Kekich).

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In the Office Action, the Patent Office also alleges that Kekich discloses that the lance tip is located within the slag phase at a depth enabling the injected gas to agitate the slag phase, and to react with matte dispersed therein (i.e., in the slag phase). The Applicants also disagree with this allegation.

Contrary to the Patent Office's allegations, Kekich fails to teach or suggest the depth of the iron based silicate slag phase and the level at which the lance tip is located in the slag phase are such that the injected gas agitates the slag phase and reacts with copper sulfide matte dispersed in the slag phase as recited by claim 1.

This allegation that Kekich teaches that the lance tip is located within the slag phase at a depth enabling the injected gas to agitate the slag phase is incorrect, and is completely at variance with the clear actual disclosure of Kekich. As indicated above, slag carried over with the matte from furnace A rises and forms a slag layer G on the matte in receptacle B. Then air is introduced into the matte J through a tube having its outlet end within the matte J, not within the slag G, to react with the matte J. The introduced air does not agitate the slag G, but rather it agitates the matte J.

Amended claim 1 recites the features of canceled claim 2. The Patent Office alleges that Kekich teaches that the slag phase has a depth which enables agitation of the slag phase by the top submerged injection therein without a stream or jet of the injected gas passing through the lower surface of the slag phase. Applicants also respectfully disagree with this allegation.

Kekich teaches that the tube L passes through the slag phase layer G and that all of the air is introduced through and below the lower surface of the slag phase, as it is introduced within the matte J and below the slag layer G. Kekich, in fact, states nothing in relation to the depth of the slag phase, although the level of spout E is such that it can not be of any significant depth. The passage of Kekich at page 2, lines 64 to 74 is completely in

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accord with Applicants' position, and negates the allegation by the Patent Office regarding the features of canceled claim 2.

With respect to claim 6, the Patent Office alleges that Kekich teaches the injections near the upper surface of the slag. Applicants disagree.

Kekich is devoid of any teaching to introduce air near the upper surface of the slag. The air, in fact, will be introduced near the lower surface of the slag if, contrary to the objection regarding claim 2, the slag layer G has little depth. Kekich, in fact, discloses introduction of air in the matte, near the upper surface of the matte and, hence, below the lower surface of the slag (see page 2, lines 34-39 of Kekich).

Applicants submit that the rejection of claim 7 is also incorrect because claim 7 necessitates air flow to be in the slag phase whereas, in Kekich, it is in the matte.

Amended claim 1 also incorporates some features of claim 8. In the Office Action, the Patent Office alleges that Kekich teaches a slag phase with iron and silicate. Applicants respectfully disagree with this allegation.

Contrary to the allegations by the Patent Office, the passage at page 3, lines 6-11 of Kekich relied on by the Patent Office for the basis of this rejection merely specifies that the matte carries iron and lead and that silica or other flux is added for forming the slag. This does not necessitate an iron based silicate slag. However, there still remains the fundamental distinction that such slag as is produced in the process of Kekich is merely to result from fluxing impurities from the matte, whereas the slag required by amended claim 1 is present from the outset and comprises the reaction medium in which the matte is dispersed and reacted.

Concerning claim 13, Applicants submit that Kekich fails to teach or suggest the use of carbon as a fuel to be burned with co-mixed air. However, even if such teaching was

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disclosed in Kekich, such teachings have nothing to do with the step of claim 13 of adding a reductant to reduce formation of magnetite and thereby suppress foaming of the slag. Moreover, in claim 13, the reductant is added to the slag whereas, in Kekich, the coal is added to the matte. Thus, in addition to the use of coal in Kekich being for a completely different purpose compared to the purpose in the present invention, the context in which the respective additions are made are quite distinct, as set forth above.

Because the features of independent claim 1 are not disclosed by Kekich, Kekich cannot anticipate, nor would not have rendered obvious, the features specifically defined in claim 1 and its dependent claims.

For at least these reasons, claims 1, 6-8 and 13 are patentably distinct from and/or non-obvious in view of Kekich. Reconsideration and withdrawal of the rejections of the claims under 35 U.S.C. 102(b) are respectfully requested.

Regarding the rejection of claims 3, 4, 5, 13 and 14 under 35 USC 103(a) as being unpatentable over Kekich:

Applicants respectfully traverse the rejections of the foregoing claims in view Kekich.

Applicants submit that the Patent Office's allegations regarding Kekich are completely at variance with the actual disclosure of Kekich, for reasons set forth above with respect to claim 1.

With specific reference to claims 3 and 4, the slag arises in the process of Kekich solely as a consequence of fluxing impurities from the matte. There is no purpose in increasing the depth of the slag layer as proposed and there is no issue of optimization. The proposal is not one that would be obvious to one having ordinary skill in the art, and such person would reject the proposal as lacking merit or relevance.

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Similarly for claim 5, Kekich fails to teach or suggest injecting at any level in the slag. At best, Kekich teaches injecting into the matte below the lower surface of the slag.

The issues surrounding claim 14 are same issues as set forth above for claim 13. The lump coal is utilized to reduce formation of magnetite to suppress slag foaming. Lump coal in Kekich would be added to the matte, not the slag, and would not satisfy the requirement of claim 14 resulting from claim 13 for addition to the slag. In contrast, Kekich merely teaches that lump coal may be used as an additional fuel source.

In view of the foregoing, reconsideration and withdrawal of this rejection are respectfully requested.

Regarding the rejection of claims 8-12 and 15 under 35 USC 103(a) as being unpatentable over Kekich in view of U.S. Patent No. 5,888,270 to Edwards et al. (hereinafter "Edwards")::

Applicants respectfully traverse the rejection of the foregoing claims in view of Kekich and Edwards.

The Patent Office acknowledges that Kekich does not teach or suggest a ferrous calcium silicate slag (see page 6 of the Office Action). The Patent Office introduces Edwards as allegedly remedying the deficiencies of Kekich. The Patent Office alleges that it would have been obvious to one of ordinary skill in the art at the time of the invention to use a ferrous calcium silicate slag because Edwards teaches that it is preferred for the main components of a slag to be highly oxidized, where preferred components include ferrous oxides, calcium oxides and silica. Applicants disagree with these allegations.

Edwards fails to remedies the deficiencies of Kekich as set forth above with respect to claim 1, from which claims 8-12 and 15 depend.

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The passage at column 2, lines 51 and 52 of Edwards fails teach or suggest a ferrous calcium silicate slag as alleged by the Patent Office. The features of canceled claim 8 are recited in amended claim 1 which expressly requires a silicate slag, in particular an iron based silicate slag. The indefinite reference at column 2 of Edwards simply refers to highly oxidized slag which is a solution of copper oxide, calcium oxide, ferric and ferrous oxides, and silica. This disclosure in Edwards covers a vast array of slag types which are not able to correctly be categorized as an iron based silicate slag. When attention is turned to express examples of Edwards, such as col. 5, line 36; col. 8, lines 5 and 6 and col. 10, lines 10-13, it is found that the only slag exemplified by Edwards is a calcium ferrite slag. This slag disclosed by Edwards is not remotely an iron based silicate slag, even though containing some silica, as a ferrite is a compound type which is distinctly different from a silicate. Moreover, contrary to the Patent Office's allegations, Edwards does disclose ratios between the oxide ratios of the calcium ferrite slag. Edwards teaches that the CaO/Fe ratio is 0.15 to 0.7 and the CaO/SiO₂ ratio is 5 to 10 and, from this, it can be calculated that Fe/SiO₂ ratio is 7.14 to 66.7 (col. 3, lines 8-15 of Edwards). Thus, the contrast is between:

	<u>Present Invention</u>	<u>Edwards</u>
Fe/SiO ₂	1.14-2.11	7.14-66.7
CaO/Fe	0.15-0.92	0.15-0.7
CaO/SiO ₂	0.22-1.11	5-10

From this it can be recognized that, while the CaO/Fe ratio for Edwards is similar to the ratio disclosed in the present specification, the calcium ferrite slag of Edwards is not remotely similar to iron based silicate slag of the invention in terms of Fe/SiO₂ ratio and CaO/SiO₂ ratio. The issue is not one of discovering an optimum range within the disclosure of Edwards, but rather of departing completely from Edwards and working in a quite different part of the Fe, CaO, SiO₂ system and using a chemically distinct slag type which is quite distinct from the industry accepted calcium ferrite slag typically used in continuous copper converting. Moreover, the presence of CaO in a calcium ferrite slag

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does not make the slag a silicate slag, despite it containing some SiO_2 , let alone an iron based silicate slag or a lime modified nor silicate slag.

In addition to these matters, even if a person skilled in the art was to use a slag taught by Edwards in the process of Kekich, this would not make good the clear and extensive deficiencies of Kekich as a disclosure relevant to the process of amended claim 1.

Neither Kekich nor Edwards, taken singly or in combination, teaches or suggests the step of adding the copper sulfide matte and flux to an agitated iron based silicate slag phase as required by claim 1. Moreover, Kekich and Edwards, taken singly or in combination, fail to teach or suggest that the depth of the iron based silicate slag phase and the level at which the lance tip is located in the slag phase are such that the injected gas agitates the slag phase and reacts with copper sulfide matte dispersed in the slag phase but so that a jet or stream of the injected gas is unable to pass through the lower surface of the slag phase and the gas is substantially precluded from contacting the continuous copper phase as specifically defined in claim 1.

Because these features of independent claims 1 are not taught or suggested by Kekich and Edwards, taken singly or in combination, these references would not have rendered the features of claim 9-12 and 15 obvious to one of ordinary skill in the art.

In view of the foregoing, reconsideration and withdrawal of this rejection are respectfully requested.

Should the Examiner in charge of this application believe that telephonic communication with the undersigned would meaningfully advance the prosecution of this application, they are invited to call the undersigned at their earliest convenience. The early issuance of a *Notice of Allowability* is solicited.

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CONDITIONAL AUTHORIZATION FOR FEES

Should any further fee be required by the Commissioner in order to permit the timely entry of this paper, including any necessary extension of time petition and fee, the Commissioner is authorized to charge any such fee to Deposit Account No. 14-1263.

Respectfully Submitted;



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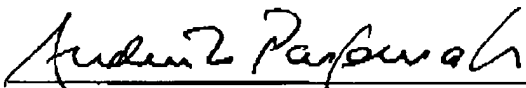


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